Effects of Entry Economic Conditions on the Career of Economics Ph.D.

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Abstract

I estimate the effect of entry economic conditions on the careers of economics Ph.D. from the top 32 programs in the U.S. graduated between 2004 and 2012. The analysis is performed on the novel data science methods of web scraping and natural language processing for fuzzy string matching based on a statistical learning approach. Exploiting the almost complete employment histories of the economists, I build the model based on task-specific human capital theory to examine the possible mechanisms driving the permanent effect on their careers caused by the entry conditions. I empirically test the model's predictions and find that the entry conditions would cause the occupational mismatch at graduation. Poor entry conditions are associated with a decreased probability of getting a full-time position in R1 university in the U.S. both in the short run and long run. I also find the entry conditions are associated with a fewer number of journal publications over the career. The primary mechanism through which graduates have a permanent effect is immobility across occupations.

JEL classifications: J23, J24, J44, J62, I23, I26

Keywords: Recent graduates, Human capital, Mismatch, Job mobility

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1 Introduction

According to the U.S. Bureau of Labor Statistics, there has been strong demand for economists in academia and practice over the decade. Many industries value economic analysis and its quantitative approach to forecast business, sales, and other market trends. Many economic indicators signal the bright outlook for the economics profession, but the pandemic shows that the profession is not immune from an economic downturn. According to the INOMICS Salary Report 2020, about one third of economists experienced wage loss, promotion delay, and unemployment in worldwide in 2020. The number of job postings in JOE Listings (Job Openings for Economists) for 2020 had 14 percent fewer job postings than 2019. Given that young workers are particularly vulnerable to unfavorable economic conditions at entry (Elsby, Shin, and Solon 2016), it raises the questions whether economics Ph.D. graduated from recessionary period might bear lasting scars, but less work has been done on whether the occupational outlook for the economists is affected by the business cycles. In this paper, I analyze the short and long-run career outcomes of economics Ph.D. as a function of entry economic conditions. I examine the first job, subsequent occupational choices, and productivity change over time and provide the economic explanations on the mechanisms driving the permanent loss.

Understanding the mechanism is fundamental in designing policies to help young workers. However, literature is heavily based on graduates from secondary education, although many labor markets, for example law firm associates or surgical residents requiring advanced degrees, have different institutional settings and barriers to entry. The labor market for economists has some unique features. Job seekers must have a Ph.D. degree in economics (or related). Most jobs are posted on the American Economic Association, and recruiting primarily happens between October and March of the following years. The workplace environment is vastly different by occupation. Academic workers usually work under up-or-out policies, in which workers who miss a set of promotion opportunities hardly make it after. Private sector workers work in high-skilled industries in which job attachment tends to be low. Also, more than half of job market candidates are internationals. The entry-year unemployment rate is very low, but the placement outcomes vary by year. Although detailed employment histories and some objective productivity measures are available on the web, little is known for occupational choices or productivity changes over time.

One of the critical mechanisms for assessing the impact of graduating during economic downturn is to evaluate job mobility since catching up would occur through job mobility. Young workers search for a good match, and they experience promotion or wage rise through switching a job, and therefore it is an essential part of a worker's early career (Topel and Ward 1992). During a recession, the number of jobs declines, as well as the quality of the job (Altonji, Kahn, and Speer 2016; Liu, Salvanes, and Sørensen 2016). For the studies on college graduates, workers are more likely to switch firms or occupations, and they gain more than their counterparts who started in a boom when they switch (Berge 2018; Cockx and Ghirelli 2016). Another building block for studying the mechanisms is to examine how human capital is valued across the firms and occupations (Becker 1994; Mincer 1993). The literature distinguishes between general-purpose skills and specific skills. The former is valued almost equally by all firms or sectors, such as education or labor market experience. The latter denotes the skills which are valued differently by what industry or firms one work at or what tasks one is assigned to (Altonji and Shakotko 1987; Kambourov and Manovskii 2009; Gibbons and Waldman 2006). In other words, the more one's skills are general, the more one could switch a job.

In this paper, I develop a theoretical model of human capital formation to understand the job mobility of economists based on Gibbons and Waldman (2006). My model incorporates occupation-specific task assignments, task-specific human capital, and matching quality between a worker and the tasks in the presence of the entry economic conditions that determine the quality of the initial placements. The model predicts that one is less likely to switch a job if the new tasks are not similar to the previous tasks, and that the decision to switch would get more demanding over time. Given that the early career change is discouraged in the economics profession, the model predicts the entry conditions effect would remain over time. I test the model's predictions using detailed information on career paths and productivity measures for economists available on the web and find that the predictions are matched.

The motivation for the model's framework originates from the popular explanation of the permanent effects of the economic downturn on the labor market outcome. It is based on a matching model (Jovanovic 1979). The recessionary cohorts would take more extended periods of time to find a job match compared to the surrounding cohorts. Spending time in bad matches would lead to wage or productivity losses and result in the wrong investment in human capital. Therefore, the disparities in human capital are the critical channel through which the effects of graduating in a bad economy will remain. However, it is not clear what types of human capital economists would develop. My model provides the testable hypothesis on whether the economist's human capital is task-specific or not.

In the second half of the paper, I examine the model's predictions using about 4,000 economics Ph.D. graduates between 2004 and 2012. I collect the graduates from 32 economics Ph.D. programs in the U.S. with the job postings data during the period. One major challenge is to scrape the relevant information from websites. It is customary for economists to post curriculum vitae (or C.V.) on the web. The problem is that I cannot limit the search to collect information from a single source. The location of the files is different on each website, and the formats of C.V. are incompatible. Some economists use Linkedin to present their work histories. Another challenge is to find the right match among the sources. The keywords to find a match are limited, for example, name, Ph.D. programs, or the date of Ph.D. completion. The problem is the registered individual names or workplace names could be different (abbreviated names, unclear last names, or too common names) among the sources, and that are prone to measurement errors. I borrow the toolkits from data science methods. I write the search algorithm automatically scraping ten relevant web sources. I also use natural language processing (or NLP) to find the most relevant matching among the words based on a statistical learning approach[1].

Using the compiled data, I find the following results. First, the demand for economists is pro-cyclical. The overall demand moves in the opposite direction from macroeconomic conditions, and the fluctuations are primarily driven by the job openings in academic tenure-track positions in the US. Second, the entry economic conditions would affect the initial placement outcomes. The recessionary cohorts are less likely to be placed in tenure-track academic positions. I also find that the recessionary cohorts would be placed at higher-ranked (lower quality) academic positions compared to the surrounding cohorts placed in tenure-track academic positions. Given that the placement other than academia is undesirable since economics Ph.D. are primarily research-oriented, it implies that the entry conditions would cause the mismatch initially. Third, the recessionary cohorts are less likely to work in academia in the long run, but the magnitude of the entry effect would decline over time. I further find that entry economic conditions would affect cohorts' productivity. In particular, graduates from the recessionary period would publish fewer journal articles. All these findings are in line with the model's predictions. I further investigate the job mobility of economists, since the main mechanism is their immobility. I find that economists rarely switch occupations regardless of entry economic conditions. It implies that the economists develop task-specific human capital, and the occupations are pretty specialized, and hence the effect of the entry economic conditions would be permanent.

The contributions of the paper are three-holds. Firstly, I provide a fresh perspective on economists' human capital formation by analyzing the consequence of the entry economic conditions and job mobility. Second, to my knowledge, this is the first study that empiri-

1. See detail in Appendix 8

cally demonstrates the connection between the task-specific human capital and worker's mobility both in academia and in practice and how it affects a range of outcomes. Finally, nevertheless, I develop the idea based on the market for economists and their careers, the applications of the model and its predictions are open to the markets in which labor is the essential input.

The remainder of the paper is organized as follows. Section 2 surveys related literature and present how I contribute to them. Section 3 lays out the model of task-specific human capital to examine the implications of job mobility for economists and provides the testable hypothesis. Section 4 presents the overview of data and relevant measures. The demand for the economist is summarized in this section as well. Section 5 discusses the empirical strategy and provides the identifying assumptions. Section 6 empirically tests the model's predictions and discusses the range of results. Section 7 concludes.

2 Literature Review

The theoretical model in the paper is based on the human capital theory (Becker 1994; Mincer 1993) and the search model (McCall 1970). The basic structure of my model is closely related to Gibbons and Waldman (2006). It supplies the intuition of task-specific human capital formation in theory and practice. It highlights the difference between task-specific human capital and occupation-specific (or firm-specific) human capital and explains why wage structure inside firms might have cohort effects. My model applies this idea to the search model. A worker accumulates task-specific human capital, and it is the most crucial input in production. I introduce the switching option to the model, and the comparative statics (or proposition) would supply the intuition of worker's mobility.

The empirical investigation of the extent to which the initial economic conditions affect the economists' career contributes to several distinct literature. The first related body of work analyzes the effects of bad starting conditions at graduation on persistent labor market outcomes. While immediate effects of entering the labor market in a downturn are expected, many worry that young workers will suffer long-lasting adverse effects. If true, this type of hysteresis could point to a lost generation of young workers who will be stuck in mismatches and low-paying jobs. One set of papers studies that people who enter the labor market during a recession indeed receive lower wages even years after the recession period (Brunner and Kuhn 2014; Kahn 2010; Oreopoulos, Von Wachter, and Heisz 2012). Microeconomic data such as CPS does not record the year when the respondent complete the education and enter the labor market, and therefore literature employs Mincerian proxy[2] for the year of labor entry. The findings imply that hysteresis might be a genuine concern, although more recent works find that the effects would vary by the level of education and college major on the wages and unemployment spell (Altonji, Kahn, and Speer 2016; Cockx and Ghirelli 2016; Hershbein 2012; Liu, Salvanes, and Sørensen 2016). Another set of papers within this body of work studies that the young workers in Europe or Japan, more inflexible labor market compared to the U.S., suffer more from finding a job compared to U.S. workers (Cockx and Ghirelli 2016; Genda, Kondo, and Ohta 2010).

This paper expands this literature by considering the effects beyond college education with detailed data. While some papers have explored differences between high and low educated workers (Cockx and Ghirelli 2016; Genda, Kondo, and Ohta 2010; Altonji, Kahn, and Speer 2016) there is as far as I'm aware no study that examines the differential effects for Ph.D. graduates. Oyer (2006) studies the impact of completing an MBA or an economics Ph.D. during a recession, focusing on graduates from seven departments in the U.S. However, research beyond elite universities is especially thin, and the long-term outcomes of the graduates who start their careers in the non-academic sectors are rarely known. Also, since the early 2000s, the demand from the private sectors and international institutes grew exponentially[3], and hence the entry conditions in the U.S. would lead to different labor market outcomes.

While the above literature has concentrated on establishing a link between initial entry conditions and future outcomes, the primary focus of this paper is to examine the channel through which these persistent losses occur. Job matching is a process that is always present over the course of a business cycle, so I first analyze whether the match quality between a worker and the initial placement would play a critical role. Many research finds that job match quality is adversely affected during recessions (Bowlus 1995; Cole and Rogerson 1999; Kahn 2010). Liu, Salvanes, and Sørensen (2016) show that cyclical skill mismatch between college graduates and employers is an essential mechanism behind persistent career loss in Norway. For the market for economics Ph.D., assuming they are research-oriented, the mismatch would imply that they are placed in which the main tasks are not research-related. I observe that R1 universities would value the academic journals more than any other occupations and that the preference would get stronger for the elite schools. Hence, I examine whether the entry conditions would affect R1 university placement records and the ranking of the academic placements.

Job mobility plays a crucial role in recovering from the damages for those who start in a recession (Berge 2018; Cockx and Ghirelli 2016), and therefore I next analyze the job

2. The sum of the year of birth, plus six and plus the years of reported education.
3. The number of postings in private sectors from JOE increases about 73 percent between 2004 and 2012.

mobility of the economists over their careers. Note that the early career changes are discouraged at universities where tenure decisions are made at a fixed point in time. It is not much known the patterns of job mobility for other occupations where economists work, but I find that the mobility is pretty low compared to other U.S. workers or inflexible labor markets in Europe. In general, an economics Ph.D. has low job mobility, and it raises the question of how it relates to the permanent effects of the entry conditions.

Most papers consider the role of the first firm in explaining the initial and persistent losses empirically(Liu, Salvanes, and Sørensen 2016; Oreopoulos, Von Wachter, and Heisz 2012). I approach the question with the task-specific human capital model I built. The task-specific human capital model could provide an explanation for cohort effects since workers are forced to develop their human capital according to the tasks assigned. If it were true, the economic downturn likely has a permanent impact on those who end up at lower-ranked schools or private sectors in which the main tasks are different from research universities. To my knowledge, there is no research applying these theories to the market for economists.

3 The Model

3.1 Theoretical Framework

In this section, I propose a model to explain the mobility of economists. I build the model based on the concept of task-specific human capital proposed by Gibbons and Waldman (2004, 2006).

I define an occupation o as the collection of firms having the same tasks. Switching firms or occupations for individuals is defined as having different firms or occupations in year t compared to year $t-1$. All firms are contained within occupations, so individuals can only switch occupations if they also switch a firm. A firm f assigns the combinations of tasks $\{1, \ldots, J\}$ to a worker. If a worker i is hired by firm f in o at t, then the worker i produces the task-specific output Y^j_{ifot} as:

$$\log Y^j_{ifot} = \sum_j \beta^j_o a^j_{iot} + \mu_{if} \text{ where } \sum_j \beta^j_o = 1 \text{ for all } o = 1, ..., O \tag{1}$$

where a^j_{iot} is i's productivity for task j for o at t, and μ_{if} represents the match quality between worker i and firm f. Each occupation combines the tasks in different ways, so β^j_o denotes the share of time a worker spends on average for task j in o. In addition to the relationship between i and o, the unobserved match component may affect the output as well. For example, individuals with the same level of productivity hired in occupation o would produce different output since some of them formed better employer matches. μ_{if} characterize a firm-match component to take account it.

The worker's productivity a^j_{iot} on task j is determined by the initial endowment of the task α^j_i and the human capital specific to the task accumulated through labor market experience:

$$a^j_{iot} = \alpha^j_i + \gamma_o H^j_{it} \tag{2}$$

where γ_o is the occupation-specific return to human capital. Task-specific human capital H^j_{it} is developed through occupation experience until time t and how much valued by the previous occupation o':

$$H^j_{it} = \lambda^j_{o'} Exp_{io't} \tag{3}$$

where $Exp_{io't}$ denotes the previous tenure in occupation o' to simplify exposition[4]. Plugging (2) and (3) into (1) yields

$$\log Y^j_{ifot} = \gamma_o \overbrace{\left[\sum_j \beta^j_o \left(\underbrace{H^j_{it}}_{\lambda^j_{o'} Exp_{io't}} \right)\right]}^{Task_{iot}} + \underbrace{\overbrace{\sum_j \beta^j_o \alpha^j_i}^{m_{io}} + \mu_{if}}_{\text{Match quality}} \tag{4}$$
$$\text{where} \sum_j \beta^j_o = 1 \quad \text{for all } o = 1, ..., O$$

Note that $Task_{iot}$ is a measure of task-specific human capital valued by occupation o. m_{io} is the match quality between i and occupation o. I assume the match quality with a firm μ_{if} is random and does not develop by time.

The specification captures critical features of how a worker's production function in which the human capitals are the primary inputs. It assesses the relationship between outputs, occupations, firms, and task-specific human capital an individual developed. $Task_{iot}$ consists of observable measures of task-specific human capital and how the occupation o values them. Match qualities are unobservable measures reflecting how much the task assignments are matched to i and the relationship between f and i.

4. $H^j_{it} = \sum_s^{t-1} \lambda^j_{os}$ where $\sum_{j=1}^J \lambda^j_{os} = 1$ for all o, s.

3.2 INCORPORATING ENTRY ECONOMIC CONDITIONS

When a worker enters the market for the first time, there are no human capitals accumulated. I impose two more assumptions to reflect the effect of economic conditions at entry. Among the set of tasks J, denote $j = 1$ as economics-related research.

Assumption 1

$$\alpha_i \equiv \left(\alpha_i^1, ..., \alpha_i^J\right) \equiv m(X_i) + e_{it}, \textit{ where } \alpha_i^1 \geqq \max_{j \neq 1} \alpha_i^j$$

The assumption 1 implies that most workers are research oriented. It is necessary to reflect the pro-cyclical demand for economists on the output.

Theorem 1

$$\textit{If } u_t < u_t', \textit{ then } \mathop{\mathbb{E}}_i \left[m_{io} \mid u_t, \sum_j H_{it}^j = 0 \right] > \mathop{\mathbb{E}}_i \left[m_{io} \mid u_t', \sum_j H_{it}^j = 0 \right]$$

It implies that mismatch between a worker and occupation would arise when the initial economic condition is unfavorable[5]. Note that m_{io} would be higher if one's abilities are well matched to the task assignments. In a recession, one would be matched to the occupation in which research tasks are less emphasized, and hence the expected value of the match quality would be lower than the good times.

3.3 MOBILITY

If i does not switch the occupation, the following corollary is derived:

Corollary 1

$$\textit{If } u_t < u_t' \textit{ and } i \textit{ did not switch } o, \textit{ then } \mathop{\mathbb{E}}_i \left[Y_{ifot}^1 \mid u_t, X_i \right] > \mathop{\mathbb{E}}_i \left[Y_{ifot}^1 \mid u_t', X_i \right] \textit{ for all } t$$

Note that Y_{ifot}^1 is research-task related output. In sum, the gap is driven by the two factors. First, if the economic conditions at entry were bad, the match-up quality between a worker and an occupation would decline, and hence the initial output gap would arise. From (3), a worker develops the task-specific human capitals according to the occupation experience. If one did not switch the occupation, the worker is forced to develop the undesirable human capital, and therefore the output gap would be enlarged.

5. The theorem is consistent with Bowlus (1995).

Consider how the task-specific human capital would be valued if a worker would switch occupations. Note again that if human capital is task-specific, one's human capital could be appreciated more if one would switch to the occupations where similar tasks are assigned. To make an exposition simpler, I examine two-task[6] model $J = \{R, T\}$. As noted above o' and o indicate the source and target occupations, respectively. From the specification (4), I derive the following proposition:

Proposition 1

$$\begin{aligned}
&\textit{For } \lambda^R_{o'} > 0.5, \ \textit{task-tenure is valued more if moves to } \beta^R_o > \lambda^R_{o'} \\
&\textit{For } \lambda^R_{o'} < 0.5, \ \textit{task-tenure is valued more if moves to } \beta^R_o < \lambda^R_{o'} \\
&\textit{For } \lambda^R_{o'} = 0.5, \ \textit{task-tenure does not change regardless of moving}
\end{aligned}$$

How the task tenure is valued depends on the degree of specialization in the source occupation. Note that $\lambda^R_{o'} = 1$ implies the occupation o' is fully specialized in research and that $\lambda^R_{o'} = 0$ implies the occupation o' is fully specialized in teaching. $\lambda^R_{o'} = 0.5$ suggests that the occupation o' is not specialized in both ways. In other words, $\lambda^R_{o'} = 0.5$ means the occupation o' would not distinguish between the two skills. The proposition indicates that if the target occupation is more specialized than the source occupation, the one's task-tenure would be valued more. If the source occupation is very general (close to 0.5), the task-tenure is valued equally by any target occupation, and hence switching does not have any merits.

3.4 Maximization problem of switching occupation

Now consider a worker's maximization problem. In each period, a worker needs to decide to switch the occupation or not. To make an exposition simpler, consider a two period problem. Suppose an individual i started the career at a firm f' within an occupation o'. In the next period, suppose a firm f within o offers i to move. However, switching the occupation is costly so that it would generate a switching cost $x_{o't}$. Hence a worker faces

$$\max_{o',o} [Y_{if'o't}, Y_{ifot} - x_{o't}] \tag{5}$$

Improvement on match-up qualities and returns to task tenure would make a shift more likely, but there is a loss from the task tenure according to the proposition 1 together with

6. For example, research and teaching, or research and all other tasks.

the switching cost $x_{o't}$

$$
\begin{aligned}
(m_{io} - m_{io'}) + (\mu_{if} - \mu_{if'}) + (\gamma_o - \gamma_{o'})\,\text{Task}_{io't} \\
> \gamma_o \underbrace{\left[(\beta_{o'} - \beta_o)\left(H^R_{it} - H^T_{it}\right)\right]}_{\text{potential loss}} + \underbrace{x_{o't}}_{\text{switching cost}}
\end{aligned}
\tag{6}
$$

Potential loss is governed by the two factors. First, $\beta_{o'} - \beta_o$ represents how similar the tasks between the source and target occupations. If they are similar, then it would be small. Secondly, how much the task-specific human capital is accumulated would affect the size of the loss.

3.5 Brief Overview of the Model's Contributions

The specification (6) provides the testable implications on the characteristic of human capital for the economists. If economists' human capital is not task-specific, the markets would be similar to the high skilled industry. If the initial mismatch happened at entry, the workers would solve it by switching, and hence the effect of entry conditions would be away soon. But if the economist's human capital is task-specific, there are two more cases. Firstly, if the economist's tasks are specialized (distance between the occupations are significant), then they would less likely switch because they might risk losing the human capital developed at the current occupation. If the initial matching is undesirable, the switching will happen early in their careers because of the potential loss of task-specific human capital and switching costs. Therefore, the initial placement effects would be long-lasting. Secondly, if the economists' human capital is task-specific but the industry is not specialized (distance between the occupation is small), then economists would more easily switch the occupation, and hence the initial placement effects are less likely permanent.

4 Data and Sample Selection

The data set contains information on Ph.D. students from 32 universities in the United States who achieved the degree from 2004 to 2012. Graduate students are identified from their dissertations posted in the ProQuest database. The number of economics-related dissertations during the period is 6,587, and I keep the individuals whose dissertation chair is in the economics department[7]. Information about each employment history is either taken from the most recent CV or the Linkedin experience section. Given that one would obtain the degree years after graduation, I correct the graduation year following their CV. From the dissertations' title, classification, identifier, and subject in ProQuest, I extract data on the field of research[8]. I construct a yearly panel to examine the career of each graduate student. I collect the publication records through EconLit. In sum, I observe name, degree award date, Ph.D. institution, bachelor institution, career history, gender[9], fields of study, and publication records for each graduate. To explore the demand for an economist, I use the number of listings in Job Openings for Economists (JOE) during the years.

I obtain the cumulative number of publications by compiling a list of journal article publications of each economist listed in the EconLit. The journals are limited to top 50 listed in *IDEAS/RePEc Simple Impact Factors for Journals*[10] for my primary analysis.

In the section 3, I define the occupation as the collection of firms having the same tasks. Change in occupation means then the skills required for new occupations would be substantially different from those used in the old occupations. Literature use occupational and industry codes from the census, but I need to build another index because of the small range of occupations economists would work at. I define the occupations in the following ways: R1 university, all other university in U.S., research organization in U.S., foreign institute, and private sector. The first occupation, R1 university, consists of 108 universities in the U.S. labeled as *Doctoral Universities: Very High Research Activity* in the Carnegie Classification of Institutions of Higher Education. The second occupation, all other university in the U.S., is the collection of all other universities in the U.S. The third occupation, research organization in the U.S., is the list of research organizations in the U.S. listed in 2004 rankings of economics research institutions available at *econphd.net* and U.S. governmental agencies. The fourth occupation, foreign institutes, consist of international schools, research organization, and governmental agencies. The last occupation, private sector, is the collection of all other remaining.

The main difference between the first two occupations is teaching loads. According to the 2004 National Study of Post secondary Faculty, faculties in non-doctoral granting universities spend more time teaching than doctoral universities (Table 13). The occupa-

7. The list of departments are economics, business, agricultural economics, health economics, political science, politics, sociology, mathematics, and statistics. Those who had an economics chair are landed at economics departments for the initial placements.

8. See Appendix **??** for details.

9. If gender is not observable, I approximate it based on the first name. See Appendix **??** for details.

10. See the list of journals on https://ideas.repec.org/top/top.journals.simple.html

tion of research organization in the U.S. does not require teaching, and the research goal would not be the same as the universities. The occupation of foreign institutes would be different from the U.S. counterparts. Each country has different institutional settings, and most international universities have other promotion policies than the U.S. (Smeets, Warzynski, and Coupé 2006). The occupation private sectors is different from other occupation based on the job descriptions. I collect all job descriptions in the JOE and examine what words are frequently used in in each occupation. There are a few words found in private sectors mostly: writing, consult, management, communication and finance. All these words are observed in every description, but the share of the counts are substantially larger in private occupations.

I use two other sources of data to further categorize institutions and create three measures of the quality of a given job. The first data is based on Oyer (2006). I define *rank* as the rank between 1 and 321 universities, and as 50 plus twice the rank from 1 to 112 for other organizations. The second measure is to follow *the Journal of Economic Literature (JEL) classifications*. JEL classifies the jobs into 5 groups. The first group is for tenure track academic positions in U.S, and the second group is part-time academic positions in U.S. The third and fourth groups are similar to the former groups but international universities. The last two groups are for all jobs other than academics.

The descriptive statistics for the sample is presented in Table 1. Compared to Table 1 in Oyer (2006), the sample compositions have evolved. As opposed to the late 1990s, the sample cohorts have become increasingly foreign and more female. The different compositions raise the questions whether any findings below vary systematically by gender and nationality. Additionally, I divide the sample by department ranks of Ph.D. awarding institutions according to *econphd.net* rankings above. In column (2), I subsample the individuals graduated from 1–10 departments. Column (3) consists of the graduates from 11–23, and column (4) is taken from 24–45 departments. Graduates from higher ranked departments are more likely male, achieved bachelor degrees in US, published more academic papers, get placed in academics jobs. Summary statistics for graduates' fields of study are given in Appendix 12.

The demand for economists are complied from the listings on JOE each year. All members of the American Economic Association have a professional obligation to list their job openings in JOE[11]. Jobs are posted every month except January and July. JOE consists of six sections. Odd number sections are full-time positions, and even number sections are part-time or temporary positions. Section 1 and 2 are academic openings in the United

11. Minutes for the Annual Meeting, December 29, 1974, American Economic Review, Proceedings, May 1975, p. 443.

States, and section 3 and 4 are academic openings located other than the US. Section 5 and 6 are non-academic positions. Figure 1 graphs JOE as a proxy for a demand that the job market candidate would face. Each panel includes the U.S. unemployment rate as of October in a previous year for another demand proxy, since the candidate starts the job search at least one year before graduation. The left panel shows the total number of postings by an academic year[12]. Over the years, the unemployment rate started to rise in 2008, peaked in 2010, and moved down after, and the JOE listings generally moved in the opposite direction. The right panel dissects the patterns of JOE by job categories for full-time positions. *academic in US* is the fraction of the total postings into full-time academic postings in US. *top 50* is the fraction of the total postings into full-time academic postings in top 50 universities in U.S. non academic in US is the fraction of the total postings into full-time non-academic postings in US. All proxies follow the unemployment rate in opposite ways with different degrees. The full-time academic postings in US have the largest share and fluctuate considerably, but the demand from the elite schools seem relatively intact.

5 EMPIRICAL STRATEGY

In the previous sections, the model predicts that the effect of entry conditions would be permanent if economists acquire task-specific human capital. In the following sections, I analyze the placement outcomes, occupational choice, publication records, and mobility to examine the effects of entry conditions. In this section, I describe the estimation strategy to identify them both in the short run and the long run.

5.1 ESTIMATION THE SHORT-TERM AND LONG-TERM EFFECTS OF INITIAL LABOR MARKET CONDITIONS

I approximate entry conditions on the labor market using the unemployment rate as of October at the one year before graduation. I begin by estimating the effect of the entry conditions on the placement outcomes. The outcome variable for a graduate i of graduating cohort c from department d with fields of study f is determined by the following linear model:

$$y_{icdf} = \beta ec_c + \gamma X_i + \lambda_d + \theta_f + \epsilon_{icdf} \tag{7}$$

12. Duplicated entries are counted separately.

in which λ_d and θ_f are fixed effects for department and fields of study, respectively. ec_c is an economic condition a cohort c face at their labor market entry. X_i includes an indicator for receiving bachelor's degrees in the U.S. and a gender indicator. ϵ_{icdf} is the error term presenting the remaining unobserved determinants of the outcome. Department fixed effects, λ_d, capture time-invariant department characteristics which lead to permanent shifts of career paths for the department's graduates. Fields of study fixed effects, θ_f, are necessary since job prospects, and the following career would be dependent on what the new graduates majored in. As the main regressor ec_c varies by cohort, standard errors are clustered by graduation cohort.

I start by investing whether one would be landed at R1 university as a full-time assistant professor given that most economics Ph.D. are research oriented. Another dependent variable is the ranking of the placements to measure the entry effects on the quality of the placements. To examine the long-term impact, I further investigate whether one would work at R1 university 5 and 9 years after graduation separately using the same specification. I do not use the panel regression since the entry conditions mainly affect the first placements rather than multi-period effects. When analyzing job mobility, I focus on the cumulative status rather than on annual changes, as these variables present little year-to-year variation. I collapse multi waves of the panel into a single cross-section and estimate the same specification. The outcome variables include whether an individual has ever switched an occupation or a firm from the initial placements.

Next, I turn to analyze the effect of entry condition on the economists' productivity. I approximate the economists' productivity using the cumulative number of publications in economics journals. The outcome variable for a graduate i of graduating cohort c from department d with fields of study f at year t is determined by the following linear model:

$$y_{icdft} = \beta ec_c + \gamma X_i + \lambda_d + \theta_f + \tau_{exp} + \epsilon_{icdft} \tag{8}$$

in which λ_d and θ_f are fixed effects for department and fields of study, respectively. I further include the labor market experience fixed effects τ_{exp} where exp represents the number of years of experience[13]. It is necessary to pick up the average effect of experience on the outcome variable. The dependent variable includes the cumulative number of articles in the top 50, top 20, and top 5 economics journals according to *IDEAS/RePEc Simple Impact Factors for Journals*.

13. The primary analysis is based on one's dissertation information or resume. Unlike CPS or other microdata, my data record the exact year of graduation and almost complete employment history. Literature tends to employ Mincerian specification to proxy potential experience, but I use actual experience since they are observable.

The both specification raises the question of the heterogeneous effect of entry conditions. The effects of a recession would be heterogeneous by gender since men and women face different circumstances when making decisions related to work, family, and household finances. The effects would be heterogenous by nationality since foreign graduate students would have a different perspective on careers and work under the unique institutional policies. Also, the effects would be heterogeneous by department rank and fields of majors. I examine these effects employing a range of interaction terms with ec_c.

The last point of interest in heterogeneity is whether the effects of the entry conditions on the outcomes would vary by years of experience. Following Kahn (2010) and Oreopoulos, Von Wachter, and Heisz (2012), I regress the outcome on the entry economic conditions for cohort c and the same control in (8) with department, field of study, and labor market experience fixed effects:

$$y_{icdft} = \sum_{e} \beta_e ec_c \cdot E_{i,exp} + \gamma X_i + \lambda_d + \theta_f + \tau_{exp} + \epsilon_{icdft} \tag{9}$$

where e denotes the number of years of experience after graduation. $E_{i,exp}$ is a binary variable indicating i's year of experience. The coefficients of interest are the β_e's, which describe the change in the experience profiles caused by the difference in the unemployment rate at graduation. I allow the effect to vary by each year of experience.

5.2 ENDOGENEITY

Several identifying assumptions are necessary. First, the effects of β would be unbiased as long as the average quality of economists entering the market is not systematically related to the state of the economy. That is, the specifications (7) and (8) treat the time of labor market entry as exogenous. However, the job market candidates might extend their years of study in order to avoid bad conditions at entry or enter early to benefit from favorable market conditions. The norm of the years of education for economic Ph.D. is five, and some might prolong their years into six or seven due to the market conditions. I find partial evidence that graduates do seem to adjust their graduation. They are more likely to delay graduation if economic conditions at graduation are bad, and the composition of the graduation cohort would be different in bad economic conditions. Then, the omitted variable bias is a real concern related with entry condition and initial placements. I conduct a range of robustness checks in section 7.

The last concern for the specifications is endogenous migration before and after graduation in most of the literature. People might migrate into the regions in response to local labor market conditions around the time of labor market entry. However, this is less concern for economists since the job matching mostly takes place at the Allied Social Science Associations (ASSA), a three-day meeting each January in one place, a few months before graduation.

6 Estimation Results

6.1 Prediction 1: Initial Placements

I first test whether the entry economic conditions predict the initial placement outcomes. I use the specification (7) to explore these connections in more detail in Table 2. The dependent variable is whether the individual held a tenure track position in R1 university. According to Assumption 1, most graduates are research-oriented, the ideal landing occupation would be a research university, and hence the model predicts the negative effects of the entry economic conditions on the placement outcome in Theorem 1.

The negative coefficient on unemployment indicates that, on average, the graduates are less likely to get hired by R1 university when the macroeconomic conditions at graduation are relatively bad, and the relationship is significant. The -0.0214 coefficient on unemployment in the first column implies that when unemployment grows by 1 percent, the graduates would be 2 percentage point less likely to hold an assistant professorship in R1 university than it otherwise would have. The coefficient on female is positive but statistically insignificant while obtaining a bachelor's degree in the U.S. is associated with a greater likelihood of working in R1 university.

The result in column (1) raises the questions on whether the entry effect would have a heterogeneous impact within the sample. It is common knowledge that positions in academia are preferred to the Ph.D. students in economics programs, and that the preference would be stronger in the top programs. I examine whether the rank of the Ph.D. program would lead to a differential effect of entry conditions on the placement outcomes. I convert the rankings of Ph.D. programs into three groups as 1–10 for tier 1, 11–23 for tier 2, and 24–45 for tier 3. In column (2), instead of department fixed effects, I add the categorical variable interacted with unemployment. The coefficients on tier 2 and tier 3 are negative and statistically significant, implying that the graduates from tier 1 programs would have a premium on the academic positions[14]. Note that the coefficients on the interaction terms are positive but insignificant, so that there would be no differential effect

14. In fact, column (3) shows that the higher the program rank, the more premium the graduates would have for R1 placements.

on graduates from tier 2 and tier 3.

While I do not find the effect of being female on the placement outcomes and the differential effect of unemployment onto females placements in column (4), the entry condition would have a differential impact for those who achieved bachelor's degrees in the U.S. In all columns, the coefficient on *US bachelor degree* is positive and statistically significant, meaning that having a U.S. bachelor would have a premium on R1 placement compared to those who got the degree outside the U.S. In column (5), the coefficient on the interaction term further presents that the entry conditions would have less impact for U.S. degree holders. Still, the joint F-test implies that the entry economic conditions would hurt the U.S. degree holders overall. It is not surprising given that graduates in U.S. colleges would be better prepared for the institutions in the U.S. such as language skills or visa status, and that the terrible entry conditions would make the international students find jobs outside the U.S.

I now focus on academic careers and test for the effect of entry economic conditions on the quality of the placements in Table 3. I approximate the quality of the placements as the ranking of the placements. The sample includes those who started their career at R1 university. The department ranks are quoted from *econphd.net rankings 2004*. If the placement is not ranked, I rank it 350. If one's position is not full-time, I rank it 400 regardless of the placements (Ge, Wu, and Zhou 2021). The dependent variable is the ranking of the placements. The positive coefficient on unemployment indicates that, on average, the graduates are more likely placed at the low-quality (higher-ranked) R1 university when the economic conditions at graduation went bad, and the relationship is significant at 5 percent level. Similar to Table 2, graduates from tier 1 programs would have a premium on the quality of placement (likely hired by lower-ranked schools), but there would be no differential effect on the quality by program tiers. Similarly, I do not find the effect of being female on the quality of the placement and the differential effect of unemployment on female placements in column (4). Compared to Table 2, there is no premium on having a U.S. bachelor degree. Still, the entry conditions would have a differential impact on the quality for U.S. bachelor degree holders in column (5) as in Table 2.

From Table 2 I find that the entry conditions would negatively affect the placement outcomes at R1 university. Given that most graduates are research-oriented, the bad entry conditions would result in an occupational mismatch. Table 3 further presents that the quality of the placement even within the R1 university placements is also lowered. Note that faculties in more prestigious institutions tend to spend less time teaching (Noser, Manakyan, and Tanner 1996). It would imply that the terrible entry conditions would result in the task mismatch even within R1 university compared to good entry conditions.

6.2 PREDICTION 2: LONG-RUN PLACEMENTS

I now test whether the entry economic conditions predict the occupational choice in the long run. The model predicts that one would not likely to switch the occupation if one developed task-specific human capital in (6). Since I find the occupational mismatch in the beginning, the gaps are likely observed in the long run. I use the same specification (7) to examine whether one works at R1 university 5 and 9 years after graduation as an extension of the previous findings. Columns (2) and (3) in Table 4 present that the entry economic conditions have a negative and statistically significant effect on the R1 placement, but relatively small in magnitude compared to the effect on the initial placement. Admittedly the magnitudes decline over time, implying that graduates would switch occupations. However, it would not be enough to close the gaps driven by the entry conditions. To examine whether the entry effects would vary by the rank of the Ph.D. programs, I add the previous categorical variable interacted with unemployment. I still find that the tier 1 programs graduates are more likely to work at R1 university than those from tier 2 and tier 3. Still, there would not be a differential effect of entry conditions in the long run.

One might raise the question of whether the entry condition would serve as a signal of ability, and its importance as a signal declines over time as more information of true ability is revealed. To test whether the effect of unemployment is getting weaker with time, I perform the regression based on the specification (9) in Table 5. I could not find the gradual effects of unemployment. In column (1), instead, unemployment would have adverse effects up until four years after graduation with similar magnitude. After four years later, the magnitude is roughly similar while it is no longer significant. I add a binary variable for whether one is placed in R1 university in the estimation as a control in column (2). The coefficients on all the interaction terms are not significant, and the regression model explains better the variability of the outcome. It would imply that the subsequent occupational choices at R1 university would be mainly driven by the first placement instead of the signaling effect.

6.3 PREDICTION 3: PUBLICATIONS

I now turn to analyze the effect of entry economic conditions on the research productivity. The main measures of research output for academic economists are their publications. Tenure in the economics department is heavily dependent on publication records in highly ranked journals (Heckman and Moktan 2020). I select the top 50 economics journals from *IDEAS/RePEc Simple Impact Factors for Journals*[15]. The dependent variable in the subsection is the cumulative number of articles published in the top 50 economics journals. I use the specification (8) to explore how the entry conditions would affect the economists' publication records in Table 6. The first four columns use the full samples.

The negative coefficient on unemployment in column (1) indicates that, on average, the individuals are less likely to publish the articles when entry economic conditions worsen, and the estimate is significant at a 5 percent level. The -0.0213 coefficient on unemployment implies that when unemployment grows by 1 percent, the graduates will publish 0.02 fewer articles on the top 50 economics journals over the career than they otherwise would have. The negative coefficient on female is not surprising since literature finds that female workers would underachieve in academic careers in which long-term human-capital investment is required (Finkel, Olswang, and She 1994). I see no significance whether one achieves bachelor's degrees in the U.S.

I further examine whether the rank of the Ph.D. programs would lead to heterogeneous effects of entry conditions on the publication outcomes. As before, I add the categorical variable of the program rankings and interact with the unemployment rate in column (2). The magnitude of the coefficient on unemployment is about 3.7 times larger in absolute value and statistically significant at any level. Both tier 2 and tier 3 graduates publish fewer journals than tier 1 graduates, and the coefficients on interaction terms imply that the entry conditions differentially impact them. In other words, the entry conditions would mainly affect the productivity of the graduates from the tier 1 programs compared to other tier graduates. In column (3), I examine the differential effect of the entry conditions on the female graduate's publication records. Female graduates would publish fewer publications than male graduates, but the interaction term is positive and statistically significant at any level. It would imply that the entry conditions would mainly affect the productivity of the male graduates compared to female graduates. I find no differential impact of having U.S. degrees on the publications.

Columns (5)–(8) examine those who started their careers at R1 university. I find similar findings compared to columns (1)–(4), but the size of the coefficients increases in absolute value mainly. In columns (2) and (6), I find that the entry conditions would negatively affect tier 1 graduates' publication records. One possible explanation is that placements in R1 are very tough for graduates in tier 2 and tier 3. Hence, if the individuals from tier 2 or tier 3 programs were landed at academic placements during the bad economic times, they would be outstanding students. In other words, the dire economic conditions would

15. I do not include invitation-only journals and proceedings journals.

positively select the best students from tier 2 or tier 3 programs, and their publications records would represent their qualities in part. Therefore, the entry conditions would not lower their publication records compared to tier 1 graduates.

The findings are in line with the model's predictions. Column (1) presents that the entry conditions would lead to a loss in economists' productivity over their careers. Table 2 shows that the entry conditions would result in an occupational mismatch. The model predicts that if economists develop task-specific human capital, occupational switching would be costly, and hence they would stay the initial occupation and the effects would remain longer. Column (5) indicates that entry conditions would lead to productivity loss even to those who placed in R1 university. Some might argue that those who started their careers at R1 university during bad economic times would be positively selected. However, the finding in column (5) would confirm my model. Table 3 presents that the entry conditions would lead to an increase in the ranking of the placements in R1. The high-ranked institutions (lower quality institutions) tend to require more teaching load to their faculties, and hence the human capitals the recessionary cohorts develop would be different from or undesirable from the surrounding cohorts. The academic occupation would discourage more early moving than any other occupations economists possibly work at. Hence, the bad entry conditions would have left permanent effects on the economists' careers, as the model predicts in section 2. In appendix 16 and 17 I examine the number of publications in the top 20 and top 5 journals.

6.4 VALIDATING THE MODEL

The mechanism driving the permanent effect of entry conditions in the model is the job mobility of individuals. Workers tend to solve the initial mismatch problem by switching jobs. I argue that economists acquire task-specific skills in the occupations, making the economists unwilling to switch occupations. The previous empirical findings show that the entry conditions would lead to the initial mismatches, and that the effects remain significant in the long run.

In this subsection, I empirically test whether the entry economic conditions would affect one's mobility decision. I focus on the cumulative status rather than on annual changes, because these variables show little year-to-year variation, and also because the dependent variable is whether one ever switches a job within a few years after graduation. The estimation is based on the specification (7) and Table 7 summarize the results for both occupation and firm switching decision. I collapse multi waves of the panel into a single cross-section and estimate the same specification. For column (1), the dependent variable is whether one ever switches the occupation within three years after graduation. Columns (2) and (3) summarize the result within the six, and nine years after graduation. Columns (4)–(6) summarize the result for the firm switching.

The insignificant estimates on unemployment in columns (1)–(3) support the model's predictions in which one would not likely switch an occupation based on entry economic conditions. The estimates in columns (4)–(6) follow the model as well since the model predicts that if one switched, it would happen at the early career, and the tasks should be similar. The entry economic conditions would likely make individuals switch a firm within three years after graduation. The significance of the estimates tends to go away over time. Since I find no evidence of occupation switching early, the target firm would be under the same occupations. Since all firms within the same occupation have the same tasks, those who switched a firm within the occupation develop the same task-specific human capital as before. Hence, if one graduated around the dire economic conditions, the effect would remain a long time.

It is natural to ask whether the individuals who started at R1 university would not switch when the entry conditions worsen. This is because I find the task mismatch in Table 3 and the permanent effect in column 5 in Table 5. I perform the same estimation using the individuals started their career at full-time positions in R1 university in Table 8. I find no effect on occupational switching and no effect on firm switching within three and six years after graduation. Column (6) shows that the entry conditions would affect the individuals to switch a firm within nine years after graduation. However, column (3) would imply the switching would happen within the occupation, so the empirical findings are still in line with the model's predictions.

I analyze the transition probabilities from the initial occupation to the occupation 9 years after graduation in Table 9. I select two cohorts from the good and bad times each to see whether the patterns are notably different. Panel a summarizes the whole samples, panel b summarizes the good cohorts, and panel c summarizes the bad cohorts. In every occupation, more than 64 percent of individuals stay at the initial occupation 9 years after graduation. It is unusually high rates compared to other U.S. workers or inflexible markets such as the Netherlands (Topel and Ward 1992; Berge 2018). I do not find notable differences between the cohorts, and it might imply the switching patterns are hardly dependent on the entry conditions for economists.

7 ROBUSTNESS CHECK

In the analysis above, I assumed that the macroeconomic conditions at the time of graduation represent an exogenous labor demand shock. That is, I assume the average quality of graduates who enters the market is not systematically associated with the economic conditions. Note that five years of study is arguably the norm of the economics Ph.D. programs. My data allow me to examine whether graduates adjust their timing of graduation to labor market conditions partially. I observe the duration of the study for 60 percent of the sample (see Figure 3). Based on the specification (7), I examine the effect of the entry economic conditions on one's decision to delay graduation in Table 10.

The dependent variable is an indicator for studying longer than five years. The estimates in all columns except column (2) present that the entry conditions would not affect graduation timing overall. In column (2), instead of department fixed effects, I add the categorical variable interacted with unemployment. Then, the coefficient on unemployment is positive and significant at the 10 percent level. It might imply that the entry conditions would lead to delay the graduation. And, the joint F-tests to examine whether the total effects are equal to zero for tier 2 and tier 3 graduates show that they are less likely to get affected by the entry conditions. It raises the concern on whether the entry conditions would only affect tier 1 graduates, although the t-tests for both interaction terms are not significant. However, intuitively it makes sense because the extra years of study are costly for the Ph.D. programs, and therefore only selected programs could afford it to their students.

If the individuals in tier 1 programs would have options to delay graduations, the quality of graduates in the tier 1 program would be associated with the entry conditions. To test the assumption, I re-run the regressions using the samples without the individuals from tier 1 programs in Table 11. In column (1), the dependent variable is whether the initial placement is at R1 university as in Table 2. Column (2) use the dependent variable is the placement ranks as in Table 3. Column (3) examines the cumulative number of publications in the top 50 economics journals. Column (5)–(8) examines the early career change as in Table 8. The magnitudes of the coefficients are changed slightly, but the result is not much different from the original regressions.

8 CONCLUSION

In this paper, I examined whether the entry economic conditions would impact economists' careers. I used cohorts from 2004 to 2012 and followed them on the labor market until

2020. I built the model based on task-specific human capital and derived the direction of job mobility. I found that if the economist develops task-specific human capital and the occupations are specialized, the individuals would not be willing to switch the occupations even though they had a poor match-up with the initial occupation. The second half of the paper empirically tested the model's predictions. First, I found the demand for the economists are largely pro cyclical. Second, the bad economic conditions would lead to the initial mismatches. Third, the effect of entry conditions would remain more than 9 years after graduation. The recessionary cohorts were less likely to work at R1 university and published fewer articles in economics journals. I tested further the mobility and found that the entry conditions would not affect the occupational switching.

Indeed, the analysis would not be complete. The research is based on the individuals' C.V. or resume, which is quite subjective. It is possible that those who updated their C.V.s often could be more successful. Also, from ProQuest, I found about 80 percent of C.V.s only. However, given that the individuals I could not find are less likely successful, I believe my results would provide the minimum effects of the entry conditions. To conclude, the transition from education to the labor market in a recession would threaten the candidate's career. Their occupational outlook would not be more desirable than surrounding cohorts, and the productivity loss is expected on average.

Table 1: Descriptive statistics of Graduates by Department Rankings

	Overall (1)	tier 1 (2)	tier 2 (3)	tier 3 (4)
Main independent variables				
female	0.2875	0.2512	0.3241	0.3090
	(0.4526)	(0.4338)	(0.4682)	(0.4623)
US bachelor	0.4262	0.4718	0.3984	0.3768
	(0.4945)	(0.4993)	(0.4897)	(0.4848)
Main outcome variables				
number of publications by 3 years	0.3277	0.4456	0.2472	0.2107
	(0.7420)	(0.8730)	(0.6274)	(0.5572)
number of publications by 6 years	0.8735	1.2083	0.6416	0.5460
	(1.5160)	(1.7781)	(1.2980)	(1.0488)
number of publications by 9 years	1.4143	1.9709	1.0201	0.8808
	(2.3256)	(2.7489)	(1.9486)	(1.5625)
Initial placements				
Tenure-track in R1 university	0.2327	0.3019	0.1846	0.1651
	(0.4226)	(0.4592)	(0.3881)	(0.3715)
Private Sector	0.2407	0.2267	0.2614	0.2411
	(0.4276)	(0.4188)	(0.4396)	(0.4279)
Number of Schools	32	10	10	12
ONumber of individuals	3,979	1,795	1,197	987

I collect the job market candidates from 32 universities in the US and group them into three categories by department rankings. The ranks are quoted from *econphd.net rankings 2004*. Column (2), (3) and (4) summarize those who graduated from 1–10, 11–23, 24–45 departments in the US, respectively. I count the number of cumulative publications from the top 50 economics journals for the primary analysis. Job mobility reports the probability of switching a job from the initial placement. Standard errors are in parentheses.

Table 2: The effect of economic conditions at graduation on the initial placement in R1 universities

	(1)	(2)	(3)	(4)	(5)
unemployment (β_u)	-0.0214***	-0.0286**	-0.0278*	-0.0172**	-0.0317***
	(0.00483)	(0.0106)	(0.0135)	(0.00654)	(0.00612)
female	0.00616	0.00570	0.00193	0.00586	0.00618
	(0.0160)	(0.0149)	(0.0150)	(0.0149)	(0.0161)
US bachelor degree	0.0589***	0.0657***	0.0664***	0.0588***	0.0587***
	(0.0109)	(0.0118)	(0.0122)	(0.0109)	(0.00877)
tier 2		-0.114***			
		(0.0145)			
tier 3		-0.128***			
		(0.0193)			
unemployment× tier 2 (β_1)		0.0168			
		(0.0151)			
unemployment× tier 3 (β_2)		0.00897			
		(0.0180)			
program rank			-0.00425***		
			(0.000794)		
unemployment× program rank (β_1)			0.000448		
			(0.000704)		
unemployment× female (β_1)				-0.0144	
				(0.0148)	
unemployment× US bachelor degree (β_1)					0.0234***
					(0.00664)
$\beta_u + \beta_1$		-0.0118		-0.0316	-0.0082
$\beta_u + \beta_2$		-0.0196			
P-val from F-test					
$\beta_u + \beta_1 = 0$		0.3335		0.0259	0.1803
$\beta_u + \beta_2 = 0$		0.0980			
mean(dependent variable)	0.2339	0.2339	0.2339	0.2339	0.2339
Observations	3916	3916	3916	3916	3916
R^2	0.063	0.040	0.034	0.063	0.064

Standard errors in parentheses and are clustered by cohort level.
* $p < 0.10$, ** $p < .05$, *** $p < .01$

The dependent variable is whether one holds a full-time position at R1 university at graduation. Estimates are based on Eq. (7), and department and fields of study fixed effects are included in the estimation except column (2) and (3). Column (2) and (3) include field of study fixed effects only. *tier 2* and *tier 3* are binary variable indicating whether one graduated from 11–23 ranked departments and 24–45 ranked departments, respectively. *Program rank* is a continuous variable indicating the rank of the PhD programs.

Table 3: The effect of economic conditions at graduation on the ranking of the initial placement for those who placed in R1 university

	(1)	(2)	(3)	(4)	(5)
unemployment (β_u)	12.30**	12.63*	14.28*	12.45*	24.51**
	(4.590)	(5.725)	(6.312)	(5.463)	(8.556)
female	0.458	0.273	0.777	0.418	1.622
	(11.54)	(9.472)	(9.478)	(11.47)	(11.26)
US bachelor degree	14.77	15.27	16.25	14.79	13.95
	(10.79)	(11.84)	(11.36)	(10.71)	(8.691)
tier 2		42.13***			
		(7.503)			
tier 3		68.10***			
		(11.02)			
unemployment× tier 2 (β_1)		-4.003			
		(6.936)			
unemployment× tier 3 (β_2)		-3.320			
		(11.26)			
program rank			2.205***		
			(0.355)		
unemployment× program rank (β_1)			-0.270		
			(0.325)		
unemployment× female (β_1)				-0.531	
				(8.717)	
unemployment× US bachelor degree (β_1)					-22.36**
					(9.337)
$\beta_u + \beta_1$		8.6290		11.9195	2.1511
$\beta_u + \beta_2$		9.3116			
P-val from F-test					
$\beta_u + \beta_1 = 0$		0.1906		0.1418	0.5991
$\beta_u + \beta_2 = 0$		0.4121			
mean(dependent variable)	137.80	137.80	137.80	137.80	137.80
Observations	1183	1183	1183	1183	1183
R^2	0.125	0.081	0.075	0.125	0.129

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

The dependent variable is the ranking of the placement. The department ranks are quoted from *econphd.net rankings 2004*. Estimates are based on Eq. (7), and the estimation only includes those who started their career from full-time positions in R1 university. If the placement is not ranked, I rank it 350. If one's position is not full-time, I rank it 400 regardless of the placements (Ge et al. 2021). I include department and fields of study fixed effects except column (2) because column (2) controls the rank of the programs. *tier 2* and *tier 3* are binary variable indicating whether one graduated from 11–23 ranked departments and 24–45 ranked departments, respectively. *Program rank* is a continuous variable indicating the rank of the Ph.D. programs.

Table 4: The effect of entry conditions on the placement in R1 university over time

	(1) initial	(2) 5 years	(3) 9 years	(4) initial	(5) 5 years	(6) 9 years
unemployment (β_u)	-0.0214***	-0.0121*	-0.00821*	-0.0286**	-0.0110	-0.00583
	(0.00483)	(0.00595)	(0.00434)	(0.0106)	(0.00659)	(0.00773)
female	0.00616	-0.00878	-0.0182*	0.00570	-0.00828	-0.0151
	(0.0160)	(0.0161)	(0.00930)	(0.0149)	(0.0153)	(0.00846)
US bachelor degree	0.0589***	0.103***	0.106***	0.0657***	0.115***	0.123***
	(0.0109)	(0.00947)	(0.0148)	(0.0118)	(0.00963)	(0.0133)
tier 2				-0.114***	-0.136***	-0.118***
				(0.0145)	(0.0171)	(0.0204)
tier 3				-0.128***	-0.138***	-0.115***
				(0.0193)	(0.0187)	(0.0180)
unemployment× tier 2 (β_1)				0.0168	0.00537	0.00415
				(0.0151)	(0.0175)	(0.0206)
unemployment× tier 3 (β_2)				0.00897	-0.00890	-0.0123
				(0.0180)	(0.0161)	(0.0163)
$\beta_u + \beta_1$				-0.0118	-0.0056	-0.0016
$\beta_u + \beta_2$				-0.0196	-0.0199	-0.0181
P-val from F-test						
$\beta_u + \beta_1 = 0$				0.3335	0.7185	0.9127
$\beta_u + \beta_2 = 0$				0.0980	0.1077	0.1453
mean(dependent variable)	0.2339	0.3069	0.2788	0.2339	0.3069	0.2788
Observations	3916	3916	3916	3916	3916	3916
R^2	0.063	0.064	0.065	0.040	0.046	0.045

Standard errors in parentheses and are clustered by cohort level.
* $p < 0.10$, ** $p < .05$, *** $p < .01$

Estimates are based on Eq. (7), and field of study fixed effect is included in all the estimations. Columns (1)–(3) further includes department fixed effects. The dependent variable in columns (1) and (4) is whether one works at R1 university at graduation. The dependent variable in columns (2) and (5) is whether one works at R1 university five years after graduation. The dependent variable in columns (2) and (5) is whether one works at R1 university nine years after graduation. *tier 2* and *tier 3* are binary variable indicating whether one graduated from 11–23 ranked departments and 24–45 ranked departments, respectively.

Table 5: The signaling effect of unemployment on the placement outcomes over time

	(1)	(2)
unemployment × exp 0–1 years	-0.0146**	0.00115
	(0.00608)	(0.00409)
unemployment × exp 2–3 years	-0.0122*	0.00355
	(0.00565)	(0.00482)
unemployment × exp 4–5 years	-0.0115*	0.00425
	(0.00578)	(0.00535)
unemployment × exp 6–7 years	-0.00770	0.00801
	(0.00510)	(0.00555)
unemployment × exp 8–9 years	-0.00701	0.00869
	(0.00454)	(0.00528)
female	-0.00672	-0.0115
	(0.0139)	(0.00664)
US bachelor degree	0.100***	0.0548***
	(0.00896)	(0.00809)
R1 university		0.773***
		(0.00897)
Observations	19580	19580
R^2	0.063	0.541

Standard errors in parentheses and are clustered by cohort level.
* $p < 0.10$, ** $p < .05$, *** $p < .01$

Estimates are based on Eq. (9), and the dependent variable is whether one works at the tenure-track position in R1 at time t. Department, fields of study, and labor market experience fixed effects are included in all estimations. *R1 university* is an indicator for whether one's initial placement is R1 university or not. *exp* is an indicator for whether one has a particual years of experience.

Table 6: The effect of economic conditions at graduation on the number of publications in Top 50 economics journals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0213***	-0.0807***	-0.0452***	-0.0136	-0.0628**	-0.0886***	-0.110***	-0.0273
	(0.00795)	(0.0244)	(0.0119)	(0.00915)	(0.0252)	(0.0306)	(0.0307)	(0.0291)
female	-0.288***	-0.278***	-0.286***	-0.288***	-0.576***	-0.558***	-0.555***	-0.571***
	(0.0240)	(0.0239)	(0.0226)	(0.0240)	(0.0563)	(0.0526)	(0.0583)	(0.0572)
US bachelor degree	0.00424	0.0594***	0.00448	0.00435	-0.00749	0.0821	-0.0165	-0.0127
	(0.0119)	(0.0123)	(0.0120)	(0.0116)	(0.0638)	(0.0506)	(0.0640)	(0.0619)
tier 2		-0.609***				-0.902***		
		(0.0485)				(0.0838)		
tier 3		-0.685***				-0.860***		
		(0.0537)				(0.0774)		
unemployment× tier 2 (β_1)		0.104***				0.149**		
		(0.0363)				(0.0671)		
unemployment× tier 3 (β_2)		0.104**				-0.0215		
		(0.0435)				(0.0646)		
unemployment× female (β_1)			0.0817***				0.167**	
			(0.0216)				(0.0706)	
unemployment× US bachelor degree (β_1)				-0.0175				-0.0645
				(0.0111)				(0.0431)
$\beta_u + \beta_1$		0.0234	0.0365	-0.0311		0.0608	0.0570	-0.0918
$\beta_u + \beta_2$		0.0229				-0.1100		
P-val from F-test								
$\beta_u + \beta_1 = 0$		0.1456	0.0108	0.0031		0.2241	0.3325	0.0124
$\beta_u + \beta_2 = 0$		0.2951				0.0254		
mean(dependent variable)	0.9225	0.9225	0.9225	0.9225	1.9321	1.9321	1.9321	1.9321
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.169	0.149	0.169	0.169	0.324	0.298	0.325	0.324

Standard errors in parentheses and are clustered by cohort level and current year t.
* $p < 0.10$, ** $p < .05$, *** $p < .01$

Estimates are based on Eq. (8) and the dependent variable is the cumulative number publications in the top 50 economics journals. The journal rankings are quoted from *IDEAS/RePEc Simple Impact Factors for Journals*. I include field of study and department fixed effects in all estimations except columns (2) and (6) because they control for the program tiers explicitly. Column (5)–(8) summarize the results for those who started their career at R1 university.

Table 7: The Effect of Entry Conditions on the Job Mobility

	Occupational switching			Firm switching		
	(1)	(2)	(3)	(4)	(5)	(6)
	$\leqslant$ 3 years	$\leqslant$ 6 years	$\leqslant$ 9 years	$\leqslant$ 3 years	$\leqslant$ 6 years	$\leqslant$ 9 years
unemployment	-0.00238	0.00166	-0.00216	0.0151***	0.0121	0.00694
	(0.00595)	(0.00842)	(0.00939)	(0.00398)	(0.00949)	(0.00774)
female	0.00586	0.0250	0.0108	0.0182*	0.00573	-0.00568
	(0.00675)	(0.0170)	(0.0176)	(0.00795)	(0.0161)	(0.0140)
US bachelor degree	0.000261	-0.00796	-0.0153	0.0345*	0.0243	0.00933
	(0.00747)	(0.0106)	(0.0128)	(0.0186)	(0.0154)	(0.0164)
mean(dependent variable)	0.1751	0.3133	0.4180	0.3199	0.5413	0.6912
Observations	3916	3916	3916	3916	3916	3916
R^2	0.019	0.021	0.015	0.023	0.017	0.014

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Estimates are based on Eq. (7), and department and fields of study fixed effects are included in the estimation. The dependent variable is a binary indicator for whether one switches the occupation or the firm from the initial placements. Column (1) summarizes whether one ever switches the occupation within 3 years after graduation. Column (2)–(3) summarize whether one ever switches the occupation within 6 years and 9 years after graduation. Column (4)–(6) summarize the result for the firm switching within 3, 6, and 9 years after graduation.

Table 8: The Effect of Entry Conditions on the Job Mobility for those who started the career at R1 university

	Occupational switching			Firm switching		
	(1)	(2)	(3)	(4)	(5)	(6)
	$\leqslant$ 3 years	$\leqslant$ 6 years	$\leqslant$ 9 years	$\leqslant$ 3 years	$\leqslant$ 6 years	$\leqslant$ 9 years
unemployment	0.000915	0.0145	0.00544	0.0136	0.0199	0.0263**
	(0.00449)	(0.0104)	(0.00974)	(0.00974)	(0.0118)	(0.00961)
female	0.00703	0.0651	0.00702	0.0250	0.0512	0.00889
	(0.0154)	(0.0378)	(0.0311)	(0.0283)	(0.0407)	(0.0344)
US bachelor degree	-0.00425	-0.0187	-0.0638	0.0204	-0.0229	-0.0199
	(0.0259)	(0.0283)	(0.0373)	(0.0420)	(0.0325)	(0.0229)
mean(dependent variable)	0.0982	0. 2128	0.3668	0.1855	0.3853	0. 6233
Observations	916	916	916	916	916	916
R^2	0.060	0.056	0.066	0.046	0.071	0.066

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

I include those who started their careers at a full-time position in R1 university. Estimates are based on Eq. (7), and department and fields of study fixed effects are included in the estimation. The dependent variable is a binary indicator for whether one switches the occupation or the firm from the initial placements. Column (1) summarizes whether one ever switches the occupation within 3 years after graduation. Column (2)–(3) summarize whether one ever switches the occupation within 6 years and 9 years after graduation. Column (4)–(6) summarize the result for the firm switching within 3, 6, and 9 years after graduation.

Table 9: Transition Probability between Occupations

	occupation 9 years after graduation				
Initial occupation	R1 university	all other US university	research org in US	foreign institute	private institute
panel a. all samples					
R1 university	74.08	5.08	6.37	8.21	6.26
all other US university	10	73.04	4.13	4.57	8.26
research org in US	11.67	3.24	67.91	4.86	12.32
foreign institute	6.31	2.87	3.78	77.87	9.17
private institute	6.17	2.54	6.89	7.01	77.39
panel b. cohorts from 07 and 08 (good cohorts)					
R1 university	74.78	3.04	6.96	9.57	5.65
all other US university	8.73	77.78	1.59	3.97	7.94
research org in US	10.34	2.59	69.83	5.17	12.07
foreign institute	7.36	1.84	0.61	77.91	12.27
private institute	5.94	1.83	9.13	7.31	75.8
panel c. cohorts from 10 and 11 (bad cohorts)					
R1 university	74.21	4.74	6.32	5.79	8.95
all other US university	8.89	76.67	5.57	1.11	7.78
research org in US	11.8	2.25	64.04	6.18	15.73
foreign institute	8.48	3.57	3.57	76.34	8.04
private institute	4.68	2.92	10.53	5.85	76.02

Each row calculates the transition probabilities from the initial occupation to the occupation working at 9 years after graduation.

Table 10: The effect of economic conditions on delaying graduation

	(1)	(2)	(3)	(4)	(5)
unemployment (β_u)	0.0247	0.0485*	0.0478	0.0243	0.0213
	(0.0136)	(0.0240)	(0.0324)	(0.0167)	(0.0159)
female	0.0202	0.00958	0.0105	0.0202	0.0202
	(0.0149)	(0.0155)	(0.0152)	(0.0151)	(0.0148)
US bachelor degree	-0.0218	-0.0255	-0.0266	-0.0218	-0.0220
	(0.0356)	(0.0357)	(0.0356)	(0.0355)	(0.0355)
tier 2		0.0102			
		(0.0282)			
tier 3		-0.0172			
		(0.0397)			
unemployment× tier 2 (β_1)		-0.0276			
		(0.0166)			
unemployment× tier 3 (β_2)		-0.0592			
		(0.0447)			
program rank			-0.000741		
			(0.00139)		
unemployment× program rank (β_1)			-0.00144		
			(0.00156)		
unemployment× female (β_1)				0.00143	
				(0.0165)	
unemployment× US bachelor degree (β_1)					0.00804
					(0.0295)
$\beta_u + \beta_1$		0.0209		0.0257	0.0292
$\beta_u + \beta_2$		-0.0106			
P-val from F-test					
$\beta_u + \beta_1 = 0$		0.2423		0.0741	0.2612
$\beta_u + \beta_2 = 0$		0.7128			
mean(dependent variable)	0.4909	0.4048	0.4048	0.4909	0.4909
Observations	2371	2371	2371	2371	2371
R^2	0.069	0.027	0.025	0.069	0.069

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Estimates are based on Eq. (7), and department and fields of study fixed effects are included in the estimation except column (2) and (3). Only fields of study fixed effect is included in column (2) and (3). The dependent variable is whether one studied longer than 5 years. The samples are limited since the records of the starting year of Ph.D. are partial. *tier 2* and *tier 3* are binary variable indicating whether one graduated from 11–23 ranked departments and 24–45 ranked departments, respectively.

Table 11: Robustness Check: Regressions without graduates from tier 1 programs

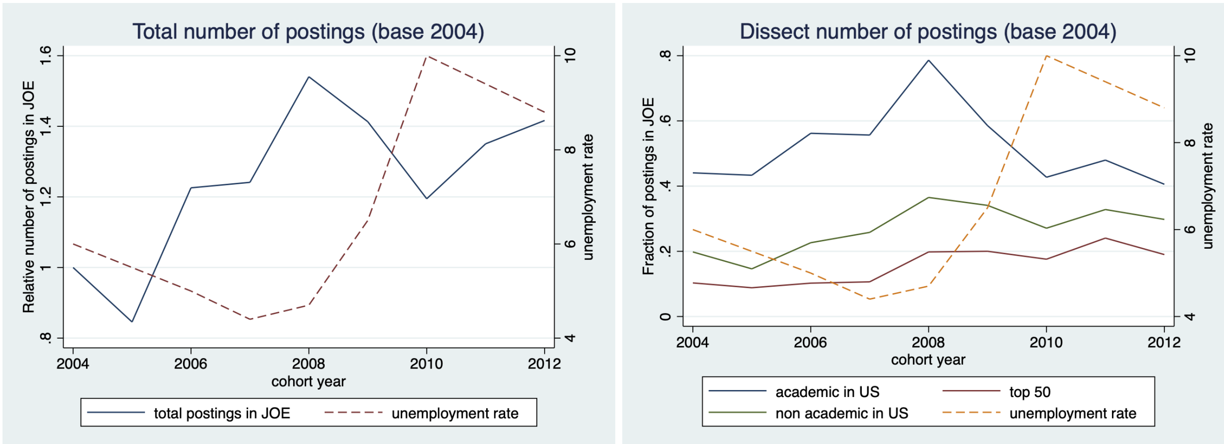
	(1) R1 university SR	(2) placement rank	(3) R1 university LR	(4) Top 50 publications	(5) OC switching $\leqslant$ 3 yrs	(6) OC switching $\leqslant$ 6 yrs	(7) FR switching $\leqslant$ 3 yrs	(8) FR switching $\leqslant$ 6 yrs
unemployment	-0.0173**	13.74**	-0.00821*	-0.0317***	-0.0108	-0.00749	0.00695	0.00737
	(0.00737)	(5.373)	(0.00434)	(0.00751)	(0.00996)	(0.0137)	(0.00886)	(0.0141)
female	0.0189	-8.914	-0.0182*	-0.221***	0.0250	0.0474*	0.0407**	0.0400
	(0.0105)	(15.22)	(0.00930)	(0.0206)	(0.0145)	(0.0216)	(0.0146)	(0.0228)
US bachelor degree	0.0642**	-9.229	0.106***	-0.0903***	-0.0125	-0.00294	0.0214	0.0360
	(0.0259)	(21.04)	(0.0148)	(0.0205)	(0.00782)	(0.0188)	(0.0200)	(0.0299)
Observations	2148	507	3916	27552	2148	2148	2148	2148
R^2	0.053	0.145	0.065	0.128	0.028	0.031	0.033	0.027

Standard errors in parentheses clustered by cohort and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

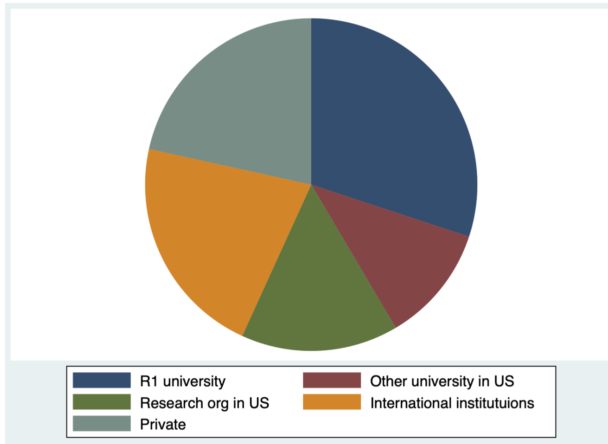
Estimates in column (1) and (2) are based on Eq. (7), and department and fields of study fixed effects are included in the estimation. The dependent variable for column (1) is whether one started the career in R1 university. The dependent variable for column (2) is the placement rank as in Table 3. The dependent variable for column (3) is whether one works at R1 university 9 years after graduation. Estimates in column (4) are based on Eq. (8), and department, fields of study and labor market experience fixed effects are included in the estimation. The dependent variable is the number of cumulative publications in the top 50 economics journals. Estimates in column (5)–(8) are based on Eq. (7), and department and fields of study fixed effects are included in the estimation similar to Table 8. The dependent variable is whether one ever switches occupation or firm within 3 and 6 years after graduation.

Figure 1: Macroeconomic Conditions and JOE Listings



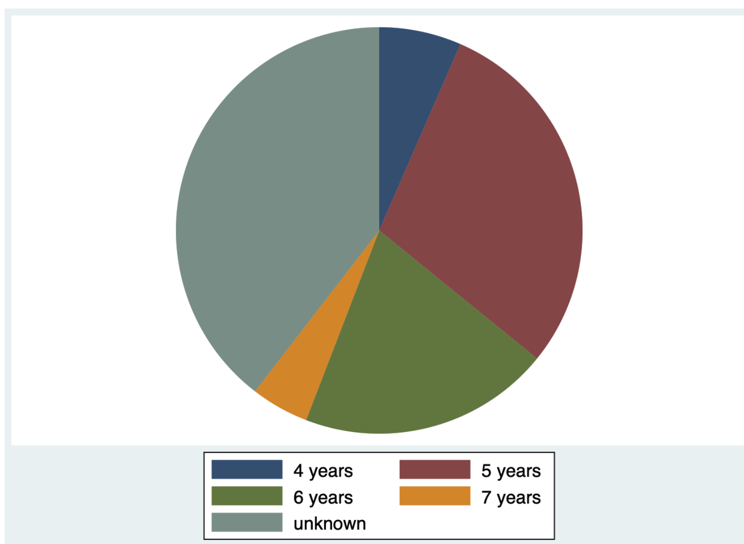
For the left panel, *total postings in JOE* is the number of postings in JOE by an academic year, and unemployment rate is the U.S. unemployment rate as of October. The former is normalized so that $2004 = 1$. The right panel dissects the number of total postings. *academic in US* is the fraction of the total postings into full-time academic postings in US. *top 50* is the fraction of the total postings into full-time academic postings in top 50 universities in U.S. non academic in US is the fraction of the total postings into full-time non-academic postings in US. Note that all the numbers in the right panel except unemployment rate is normalized based on 2004.

Figure 2: Distribution of the Initial Placements



The figure summarizes the distribution of intitial placements. The percent of R1 university, other university in US, resaerch organization in US, international institutes and private sectors are: 30%, 11%, 15%, 22%, 22%

Figure 3: Distribution of the Year of Study



The figure summarizes the availablity of years of study.

APPENDIX A. TECHNICAL APPENDIX

Updating...

Appendix B.

I further test whether the entry condition would have differential impact on the placement outcomes by one's field of study. I divide the samples into Micro and Macro using the JEL classification of the dissertation. For macro, I include G (Finance), E (Macroeconomics and Monetary Economics) and F (International Economics). For micro, I include J (Labor), I (Health and Education), D (Microeconomics), K (Law and Economics), L (Industrial Organization), R (Urban), O (Agriculture) and H (Public Economics). I use the specification (7) and perform the regression on the subsamples of Macro, Micro, and JEL classifications in Table 15. Note that the dependent variable is whether one is hired in R1 university. I find the significant coefficients as in Table 2 for the Micro group and some micro-related JEL classifications. This is in part because financial sectors and international organizations demand macro-related fields more than micro.

Table 12: Descriptive statistics of Graduates by JEL classifications

JEL classificaitons	fields of study	rank 1 (%)	rank 2 (%)	rank 3 (%)
G	Financial Economics	27.05	27.47	22.01
J	Labor	18.27	21.46	18.29
D	Microeconomics	9.13	9.71	8.79
I	Health, Education	8.16	7.03	7.44
C	Mathemathical methods	6.15	3.89	5.86
M	Business	5.17	3.89	4.59
E	Macroeconomics	5.00	7.31	7.68
F	International Economics	4.42	5.00	5.94
O	Development	3.73	2.78	2.93
H	Public	2.99	2.96	2.53
L	IO	2.81	2.13	2.77
Q	Agriculture and Environment	2.47	2.59	5.15
K	Law	0.92	0.56	0.40
R	Urban	0.92	1.11	2.61
N	History	0.69	0.65	0.55
P	Economic System	0.63	0.19	0.40

To classify fields of study, I use grduates' ProQuest dissertation information: title, classification code, abstracts, identifiers, and subjects. See appendix for technical details. The each column summariz those who graduated from 1–9, 10–19, 20–45 departments in U.S., respectively.

Table 13: Classes: hours per week teaching credit classes

	1-3 hours (%)	4-7 hours (%)	More than 7 hours (%)
Estimates			
Total	22.4	27.8	49.8
Institution: level			
2-year	18.3	23.7	58
4-year non-doctoral granting	18.6	23.5	57.9
4-year doctoral granting	27.4	33.1	39.6

Source: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Post secondary Faculty

Table 14: The effect of entry conditions on the initial placement: multinomial logit

	(1)	(2)
2. all other universities		
unemployment	-0.106**	-0.0838*
	(0.0454)	(0.0499)
3. research org		
unemployment	0.138**	0.134**
	(0.0663)	(0.0630)
4. foreign institute		
unemployment	0.188***	0.188***
	(0.0431)	(0.0447)
5. private sectors		
unemployment	-0.0247	-0.0181
	(0.0403)	(0.0364)
FX		department, fields of study
Observations	3979	3916

Base is R1 university

Gender and US bachelor degrees are controlled.

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 15: The effect of initial labor market conditions on the initial placement by Fields of Study

	(1) Macro	(2) Micro	(3) JEL G Finance	(4) JEL J Labor	(5) JEL D Micro	(6) JEL I Health	(7) JEL E Macro	(8) JEL C Quant	(9) JEL F International	(10) JEL M Business	(11) JEL Q Agri	(12) JEL O Dev	(13) JEL H Public	(14) JEL L IO
unemployment	-0.0207	-0.0328***	-0.00619	-0.0110**	-0.0460**	-0.0240*	-0.0199	0.0102	-0.0957**	0.00496	-0.0270	-0.0164	-0.00465	-0.0580
	(0.0127)	(0.00484)	(0.0153)	(0.00475)	(0.0144)	(0.0117)	(0.0217)	(0.0348)	(0.0308)	(0.0205)	(0.0386)	(0.0309)	(0.0513)	(0.0313)
female	0.00610	0.0228	-0.00477	0.0181	-0.00904	0.0702	0.00385	0.0658	0.0481	-0.188	-0.154*	0.0740	-0.132	0.00611
	(0.0207)	(0.0180)	(0.0338)	(0.0355)	(0.0562)	(0.0426)	(0.0861)	(0.0933)	(0.0681)	(0.105)	(0.0746)	(0.102)	(0.0829)	(0.126)
US bachelor degree	0.0358	0.0676***	0.0450	0.0660***	-0.0261	0.148**	-0.00840	0.0159	-0.00288	0.0957*	0.0643	0.0535	0.269*	0.0678
	(0.0278)	(0.0179)	(0.0342)	(0.0189)	(0.0619)	(0.0555)	(0.0566)	(0.0558)	(0.0472)	(0.0500)	(0.0862)	(0.0884)	(0.128)	(0.121)
Observations	1484	1859	1019	766	363	301	259	217	205	176	128	123	104	99
R^2	0.069	0.062	0.075	0.081	0.117	0.142	0.136	0.183	0.192	0.166	0.339	0.199	0.292	0.363

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Estimates are based on Eq. (7), and department fixed effect is also included in the estimation. The column (1) and (2) summarize macro and micro related fields. For macro, I include G (Finance), E (Macroeconomics and Monetary Economics) and F (International Economics). For micro, I include J (Labor), I (Health and Education), D (Microeconomics), K (Law and Economics), L (Industrial Organization), R (Urban), O (Agriculture) and H (Public Economics).

Table 16: The effect of economic conditions at graduation on the number of publications in Top 20 economics journals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0128***	-0.0560***	-0.0240***	-0.00553	-0.0293	-0.0751***	-0.0574**	-0.0129
	(0.00487)	(0.0181)	(0.00788)	(0.00617)	(0.0189)	(0.0268)	(0.0246)	(0.0253)
female	-0.159***	-0.152***	-0.158***	-0.159***	-0.408***	-0.400***	-0.396***	-0.406***
	(0.0145)	(0.0144)	(0.0143)	(0.0145)	(0.0372)	(0.0341)	(0.0391)	(0.0371)
US bachelor degree	-0.0286***	0.0200**	-0.0285***	-0.0285***	-0.203***	-0.0996***	-0.208***	-0.205***
	(0.0102)	(0.00903)	(0.0103)	(0.00992)	(0.0420)	(0.0356)	(0.0418)	(0.0408)
tier 2		-0.462***				-0.792***		
		(0.0356)				(0.0688)		
tier 3		-0.487***				-0.778***		
		(0.0374)				(0.0664)		
unemployment× tier 2 (β_1)		0.0684**				0.150***		
		(0.0285)				(0.0539)		
unemployment× tier 3 (β_2)		0.0745**				0.0658		
		(0.0328)				(0.0608)		
unemployment× female (β_1)			0.0385**				0.0994*	
			(0.0169)				(0.0519)	
unemployment× US bachelor degree (β_1)				-0.0165**				-0.0300
				(0.00736)				(0.0370)
$\beta_u + \beta_1$		0.0123	0.0144	-0.0219		0.0746	0.0420	-0.0428
$\beta_u + \beta_2$		0.0185				-0.0093		
P-val from F-test								
$\beta_u + \beta_1 = 0$		0.3150	0.2094	0.0004		0.0430	0.3043	0.1187
$\beta_u + \beta_2 = 0$		0.2637				0.8279		
mean(dependent variable)	0.5094	0.5094	0.5094	0.5094	1.2222	1.2222	1.2222	1.2222
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.131	0.113	0.131	0.131	0.274	0.245	0.275	0.275

Standard errors in parentheses and are clustered by cohort level and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Estimates are based on Eq. (8) and the dependent variable is the cumulative number publications in the top 20 economics journals. The journal rankings are quoted from *IDEAS/RePEc Simple Impact Factors for Journals*. I include field of study and department fixed effects in all estimations except columns (2) and (6) because they control for the program tiers explicitly. Column (5)–(8) summarize the results for those who started their career at R1 university.

Table 17: The effect of economic conditions at graduation on the number of publications in Top 5 economics journals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.00339	-0.0216**	-0.00523	-0.00209	0.0128	0.000553	0.00992	0.0101
	(0.00232)	(0.00987)	(0.00396)	(0.00244)	(0.00781)	(0.0173)	(0.0128)	(0.0121)
female	-0.0813***	-0.0756***	-0.0812***	-0.0813***	-0.193***	-0.167***	-0.192***	-0.193***
	(0.00786)	(0.00750)	(0.00785)	(0.00786)	(0.0211)	(0.0181)	(0.0218)	(0.0211)
US bachelor degree	-0.00680	0.0225***	-0.00678	-0.00678	-0.103***	-0.0435**	-0.103***	-0.102***
	(0.00422)	(0.00426)	(0.00423)	(0.00418)	(0.0213)	(0.0167)	(0.0210)	(0.0207)
tier 2		-0.243***				-0.504***		
		(0.0184)				(0.0424)		
tier 3		-0.261***				-0.490***		
		(0.0193)				(0.0391)		
unemployment× tier 2 (β_1)		0.0302**				0.0717**		
		(0.0151)				(0.0324)		
unemployment× tier 3 (β_2)		0.0299*				0.0144		
		(0.0171)				(0.0369)		
unemployment× female (β_1)			0.00629				0.0103	
			(0.00723)				(0.0247)	
unemployment× US bachelor degree (β_1)				-0.00296				0.00495
				(0.00362)				(0.0158)
$\beta_u + \beta_1$		0.0085	0.0010	-0.0050		0.0722	0.0201	0.0150
$\beta_u + \beta_2$		0.0082				0.0149		
P-val from F-test								
$\beta_u + \beta_1 = 0$		0.1973	0.7985	0.1475		0.0003	0.1910	0.1398
$\beta_u + \beta_2 = 0$		0.2726				0.4804		
mean(dependent variable)	0.1842	0.1842	0.1842	0.1842	0.4633	0.4633	0.4633	0.4633
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.097	0.077	0.097	0.097	0.192	0.159	0.192	0.192

Standard errors in parentheses and are clustered by cohort level and current year t.
* $p < 0.10$, ** $p < .05$, *** $p < .01$

Estimates are based on Eq. (8) and the dependent variable is the cumulative number publications in the top 5 economics journals. The journal rankings are quoted from *IDEAS/RePEc Simple Impact Factors for Journals*. I include field of study and department fixed effects in all estimations except columns (2) and (6) because they control for the program tiers explicitly. Column (5)–(8) summarize the results for those who started their career at R1 university.

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